This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

G. A. Somerset
8° 100

AN

INQUIRY

INTO THE

CONTENTS

AND

MEDICINAL VIRTUES

OF

Lincomb *Spaw Water*,

NEAR

BATH.

BIBLIOTHECA BODLEIANA

/10

By *WILLIAM HILLARY*, M. D.

LONDON:
Printed for J. LEAKE, Bookſeller in *Bath*; and
Sold by C. HITCH, in *Pater-noſter Row.*

M. DCC. XLII.

Gough Adds Somerset
8° 100

)

,

C.

and
ater
ſan-
ad-
ron,
and
ark-
nte-
ſh'd
ı his
Zeal
for

TO THE RIGHT HONOURABLE

PHILIP,

EARL OF

Cheſterfield, &c. &c.

My LORD,

AN Inquiry into the Nature and Virtues of a mineral Water which promiſes much Benefit to Mankind, cannot be more properly addreſſed to any one, than to a Patron, who has experienced its Virtues, and ſeen its good Effects in ſome remarkable Caſes; a Patron whoſe Integrity, Judgment, and accompliſh'd Abilities are no leſs eminent, than his diſtinguiſh'd Benevolence and Zeal for the Good of the Publick are univerſally acknowledged.

To reſcue this medicinal Water from Neglect and Obſcurity, and to render it more extenſively uſeful, is what I aim at: If my Endeavours are favoured with the Approbation of his Lordſhip, and the Judicious, the partial Cenſures of thoſe who are intereſted in oppoſing them, will have leſs Weight with the Benevolent.

His Lordſhip's Permiſſion ſo generouſly granted, to inſcribe this little Piece to his Name, is a freſh Inſtance of his generous Regard for the publick Good, and demands the ampleſt Returns; but the only one in my Power, is, my moſt grateful Acknowledgments, which, with my ſinͨereſt Wiſhes for his Lordſhip's Health and Happineſs, are conſtantly paid, with the greateſt Deference and Humility, by the Author,

W. H.

THE PREFACE.

THE Mineral Water, which is the Subject of the following Eſſay, owes its Diſcovery to the following Accident: One Charles Melſom, *a Cooper, having ſome Labourers at Work near the Place where this Water ſprings, treated them, one Day, with a Bowl of Punch, made with this Water, and ſome Brandy which had been kept in an Oaken Cask: The Punch quickly changed to a blackiſh purple Colour, which ſo ſurpriſed the Workmen, that ſome of them refuſed to drink it: He told this to a Neighbour of his, who acquainted me with the Accident, from which I readily judg'd* *judg'd it to be a Chalybeat Water; and ſome time after, going to ſee the Spring, I preſently found from its Smell and Taſte, and a few ſlight Experiments, that it was ſo, but that it differed very much in ſeveral reſpects from every other Spring of that kind, which I had hitherto ſeen.*

This induced me to reſolve upon making a further Inquiry into its Medicinal Virtues; but the Spring riſing in a very wet Bog, almoſt covered with Shrubs and Graſs, and the Seaſon cold, I deferred it till the Summer following. In 1738 *I began the Experiments, which being taken Notice of, led great Numbers of People to the Place, ſome through Curioſity, others in Hopes of obtaining Relief for their Diſorders, many of whom made uſe of the Waters both internally and externally, and, as it commonly*

commonly happens in Diſcoveries of this kind, in all Caſes promiſcuouſly, and with the Succeſs which one might naturally expect from the Uſe of a Remedy, in itſelf efficacious, but ſalutary or otherwiſe, as it is properly or improperly uſed.

I had by this means however an Opportunity of obſerving its Effects in various Caſes, and was thereby not a little aſſiſted to judge wherein it might be uſeful, and wherein injurious: The Reſult of my Experiments and Obſervations upon it, are now preſented to the Publick; I have given a faithful Account of them, and all ſuch remarkable Phænomena *and Changes which appeared upon making them, as I apprehended might be any way inſtructive: I have alſo added a few Caſes, wherein the Effects of the Waters ſeemed to be very obvious; and others, perhaps*

perhaps may be added hereafter. I am not conſcious of having ſaid any thing to byas the Reader unjuſtly, or of omitting any Circumſtance which I thought could aſſiſt him to form a true Judgment of the Nature of the Subject before him; all that I aim at is, to recommend to the Notice of the Publick, a Mineral Water, *which is found to be efficacious in the Cure of many Diſeaſes, yet without extolling it as an infallible* Panacea *in all.*

There are ſeveral other Chalybeat Springs near this City, and one about Three Miles from it, at Bathford; *but as I found them, upon Examination, to be only weak, ſimple Chalybeat Waters, ſuch as we meet with in moſt Parts of this Nation, I forbear to take any further Notice of them.*

Bath, May 8.
1742.

AN INQUIRY

Into the CONTENTS, &c. of *LINCOMB* Spaw Water.

SECT. I.

1. THE Mineral Spring now commonly known by the Name of LINCOMB SPAW, riſes near the Bottom of a pleaſant little Valley on the South Side of, and about half a Mile diſtant from, the *City* of BATH. The natural Agreeableneſs of the Place is increaſed by the Conveniences made for the Accommodation of thoſe who reſort to the *Spaw*.

2. The Water ſprings in a ſmall boggy Place, between two ſteep little Hills; where it bubbles up almoſt perpendicularly, thro' a Bed of Marl like odd-form'd Petrefactions,

which lies upon a thick Bed of ſtiff blue Clay, mix'd with *Marcaſites* and *Iron Stone.*

3. The *Stratum* of Marl like Stones is cover'd with another Bed of the ſame ſort of Clay, which is likewiſe mix'd with *Marcaſites* and *Iron Stone.*

4. The Water riſes from between theſe two Beds of Clay through the *Stratum* of Marl-like Stones, in two diſtant Springs, tho' within a few Inches of each other, into a ſmall Stone Baſon, which is conveniently cover'd with Free-ſtone, and ſhelter'd from the Weather.

5. Tho' theſe two Springs ariſe ſo near to each other, that they cannot be taken up apart, ſo as to be ſubjected to a diſtinct Examination yet it appears, that they are of different Natures; for one of the Springs gives the Marl-like Stones through which it riſes, a reddiſh-orange ochry Hue, and a ſtrong ferruginous Smell, both which they retain a long time, tho' expos'd to the open Air; the other turns the ſame Stones to a ſhining Jet-black externally, or rather covers every Part of them, where it reaches, with a thin, ſoft, ſhining Jet-black *Bitumen,* and tinges their Inſides quite through, with a dark-bluiſh grey Colour, (tho' ſome of them are pretty large) and gives them a ſtrong ſulphureous Smell, ſomething like that of a Gun new fired.

6. This *Bituminous Matter*, together with the ſulphureous Smell, intirely exhales, when the Stones are expoſed to the Air for two or three Days, and leaves them of a whitiſh Marl or Free-ſtone Colour, which is their natural one, where this Water does not touch them.

7. Theſe hard, marl-like, porous Stones (§ 2.) become ſoft and friable where they are waſh'd by this Water; and after being expoſed a few Days to the Air, may be eaſily rubb'd to Powder with one's Fingers; whereas ſome of the ſame Stones, taken out of the ſame Bed at a few Yards Diſtance, untouch'd by this Water, retain their natural Hardneſs, though they have been expoſed to the Weather three or four Years.

8. The *Marcaſite* (§. 2.) is of a heavy, ſolid, uniform Texture throughout, externally of a bluiſh Lead Colour, with ſome yellow, ſhining, ſparkling Particles, and a dusky Braſs Colour within; has a ſtrong ſulphurious Smell, and a ferruginous Taſte, when applied to the Tongue: Infuſed in hot Water, it gives it a Vitriolic Taſte; which Water will turn to a deep Purple with Tincture of Galls: when powder'd and thrown on a red-hot Iron, it ſparkles and flaſhes like Gunpowder, gives a ſtrong ſulphureous Smell, and leaves a red *ocus Martis.*

9. What I call *Iron Stone*, (§. 2, 3.) is a hard, ponderous, compact mineral Subſtance,

in globular Lumps, of a ruſty brown Colour, and ſeems to be either a poor Iron Ore, or a very hard Marcaſite.

10. I cauſed ℔ſs of the *Marl Stone, Marcaſite, Iron Stone*, and *blue Clay*, to be infuſed in ℔ij of cold Water in different Glaſſes, for ten Days; the Waters were then filtred and kept ſeparate. That from the *Marl* ſmelled like Lime-water: Tincture of Galls made no Change in it; Oil of Vitriol produced no Alteration; with Oil of Tartar, it gave a pearl or milky Colour, and with Syrup of Violets a faint Green.

The *Marcaſite Water* had acquired a ferruginous or chalybeat Taſte, and 3 Ounces of it mix'd with 4 Drops of Tincture of *Galls* changed to a dark Purple; Oil of Vitriol produced a vermicular Motion in it, and Oil of Tartar a Pearl-colour'd Cloud.

The *Iron Stone* Water was no way affected by any of theſe Additions.

That from the *blue Clay* became of a cloudy Pearl with Oil of Tartar, but was not alter'd with the Oil of Vitriol, or Tincture of Galls.

11. I digeſted four Ounces of each of theſe Subſtances together in ℔jſs of pure Water, in a Sand Heat, 48 Hours, with a Fire of the ſecond Degree. At the ſame time ℔ſs of the *Marcaſite* in Powder was infuſed in ℔jſs of Water in another Veſſel, in the ſame Heat: Each of them had a Bolt-head cloſe luted on.

The compound Infuſion, when filtred, turned to a deeper blackiſh Purple by ſtanding two Hours with 5 Drops of the Tincture of Galls, than the *Marcaſite* Infuſion alone did. It precipitated a whitiſh grey Powder with Oil of Tartar: In other Reſpects they appeared alike; only the digeſted *Marcaſite Water* had contracted an empyreumatical Smell, and a yellowiſh brown Circle adhered to the Sides of the Veſſel round the Surface of the Water. Both had a chalybeat Taſte.

12. It appears from the preceding Obſervations and Experiments, that the *Marcaſite* is the Baſis or chief impregnating Principle of this mineral Water. And it ſeems to be no unreaſonable Conjecture, to ſuppoſe, that the alcaline Part of the blue Clay, (§. 10.) and Marl Concretions, (*ibid.*) contribute ſomething towards perfecting it; partly as it diſſolves the *Sulphur* of the *Marcaſites*, and renders it miſcible with the Water; partly as it is capable of promoting (if it is not the chief Author of) that inteſtine Conflict in the Water, to which the fugitive mineral Spirits in this and other briſk pungent chalybeat Waters owe their Riſe: But of this more hereafter.

13. What other *Strata* of Foſſils this Water paſſes through, before it comes to Light, we durſt not examine, leſt we ſhould thereby divert the Courſe of the Spring, or let ſome other Waters into it.

SECT.

SECT. II.

1. THE Free-ſtone Baſon which is the Receptacle, and the Chanel thro' which the waſt Water is convey'd from the Spring, were changed from their natural Colour to a deep orange ochry one, in ſix or eight Hours after they were laid.

2. The hard Flint Glaſſes uſed in drinking the Water, became of a dark brown Colour in a few Days time; and a large Quantity of Ochre is depoſited in the Water's Courſe from the Spring.

3. The Quantity of Water afforded is nearly the ſame at all times; it doth not ſeem to be increaſed in wet, or diminiſh'd in dry Seaſons: I found on repeated Trials, that it yields about ten Pints Wine Meaſure in a Minute, or 75 Gallons an Hour, which make 1800 Gallons *per diem*, a Quantity more than ſufficient to ſupply any Number which perhaps may ever reſort to it.

4. Its Smell, as to Strength, is variable: Before the Spring was cover'd, it might ſometimes have been perceiv'd by a nice Organ at the Diſtance of 30 or 40 Yards; at other Times, at no more than 6 or 8. Which Variability, I conceive, is not intirely owing to the Alteration of the Air, or the Organ of Smelling, but in part to the greater or leſs Degree of Volatility of the

Sulphur; this Variation being common to the *Geronſter* as well as the *Lincomb Water*.

5. In Coldneſs it differs little from other Springs equally expoſed to the Air, and ariſing from an equal Depth: *Fahrenheit's* Thermometer being ſuſpended in the Well for half an Hour, in different Seaſons, the Mercury ſtood at all the Trials at 52 Degrees, except in the hard Froſt of the Winter $17\frac{39}{40}$, when the Mercury ſtood at 50; which is only two Degrees of Heat leſs than in the hotteſt Summer's Day, and even then two Degrees warmer than temperate, by the ſame Scale.

6. The ſpecific Gravity of this mineral Water is at all times conſiderably heavier than either diſtilled, or our River Water; but it is variable in its Weight, when compared with itſelf at different times, as appear'd from repeated Experiments *.

---

* Several Glaſſes of different Sizes were made in the Form of the Figure (A Fig. 1.) annex'd, the Length of whoſe Necks were 3 Inches, the Diameter of their Hollow about $\frac{1}{8}$ of an Inch.: Their Necks were graduated into 3 Inches, each Inch into eight equal Parts; a ſingle Drop would raiſe the Surface of the Water, when they were filled, perceptibly above the Line with which it was equal before. With theſe Glaſſes I could

7. The Water, freſh taken up, in a clean Glaſs, is clear and tranſparent.

8. When

---

could at any time weigh the ſame Quantity of Water to a Drop. The Hook B may be fixed to the Neck of each Glaſs with the Screw C, and hung to the Arm of an exact Balance: The affixed Tube D permits the Air to eſcape as the Veſſel fills; ſo that it is done with little Loſs of any volatile Parts of the Water to be examin'd.

I generally filled and weighed three of theſe Glaſſes at a time; but as I obſerved no Variation in the Experiment, I ſhall only give the Hiſtory of one, which when fill'd to the Height of 2¼ Inches of the graduated Scale, contain'd 16 Cubic Inches and 7 Grains of this Water.

This Glaſs fill'd exactly to the Height ſpecified, with the *Lincomb Water*, at different Times weigh'd as follows.

	oz.	*dr.*	*ſc.*	*gr.*
June 2. 1738. The Water weigh'd	9	1	2	07
—— 8. - - -	9	1	2	08½
——29. - - - -	9	1	2	11
Aug. 7. - - - - -	9	1	2	10
June 6. 1741. - - - -	9	1	2	09½
——12. - - - -	9	1	2	10
——13. - - - - -	9	1	2	09
——18. - - - -	9	1	2	11
July 15. - - - - -	9	1	2	07
Aug. 24. - - - -	9	1	2	07

This Table demonſtrates, that it differs from it ſelf, at different times, conſiderably.

The

8. When it is received from the Spout into a Glaſs, very numerous Bubbles appear: the ſame happens, if it be poured from one Glaſs into another; and if it be briskly ſhook in a cloſe-ſtopp'd Vial, or cover'd Glaſs, it ſparkles in a beautiful manner; if the Vial be then ſuddenly open'd before the Commotion ceaſes, it emits an elaſtic Vapour, with an

---

	oz.	*dr.*	*ſc.*	*gr.*
The ſame Glaſs fill'd to the ſame Height with common Water diſtill'd, weigh'd	9	1	2	05
River *Avon* Water - - -	9	1	2	06
King's Bath Water hot at the Pump	9	1	1	08
The ſame cold - - -	9	1	2	13
The *Hot Bath* Water warm at the Pump	9	1	1	08$\frac{1}{2}$
The ſame cold - -	9	1	2	11$\frac{1}{2}$
The *Geronſter*, imported	9	1	2	07
Lincomb Spaw, at a Medium	9	1	2	09
Pure Spring Water near the *Lincomb* Spaw	9	1	2	05

Whence it appears, that the *Lincomb* Water is at all times heavier, and ſometimes conſiderably ſo, than either diſtilled or common Water.

The Reaſon why the *Bath* Waters are ſo much lighter when warm, than cold, is owing to the Rarefaction occaſion'd by the Heat: As they cool, the Water condenſes, and ſubſides ſo as to require gr. xxv. of the King's Bath, and xxiii. of the Hot Bath, to fill the Glaſs to the ſame Standard.

audible Exploſion, and a ſmall perceptible Force.

9. When the Water has ſtood about an Hour in an open glaſs Veſſel, a pearly-colour'd Cloud forms itſelf of the Figure of a Cone with its Baſis upwards, and of equal Dimenſion with the Surface of the Water ; and, in two Hours Time, a thin variegated unctuous Scum covers the Surface of the Water, which has a Smell a little ſulphureous.

10. If it be kept in a Veſſel cloſe ſtopp'd, it begins to loſe its Tranſparency in about 2 Hours, and acquires a faint Pearl or Whey Colour.

11. The Alteration proceeds in the ſtopp'd and open Veſſel alike (excepting the Time) ; and this Wheyiſh Colour gradually changes to a yellowiſh Orange-Ochry Colour ; and in about ten or eleven Hours, ſome ſmall Particles of Ochre ſeparate and ſubſide.

12. This Precipitation of Ochre is completed in about twenty-two Hours in an unſtopp'd *Florence* Flask ; in ſomewhat leſs time where the Air is admitted to a larger Surface ; and requires a few Hours more, if it be kept in Bottles very cloſe cover'd with cement or oil'd Bladders.

13. The Precipitation being finiſh'd, the Ochre lies in *Flocculi* at the Bottom, whilſt

the Water above remains clear and pellucid.

14. A larger Quantity of Ochre ſubſides when the Water is kept in a Glaſs, or other Veſſel, quite open, than in a Bottle fill'd to the Neck, or intirely cloſ'd, as well as it is depoſited ſooner.

15. If a Bottle be filled at the Spring, and immediately cloſ'd with Cement or oil'd Bladder, after changing its Colour [9.] and depoſiting its Ochre, (12.) it will, about ſix Days after, diſſolve all its ſeparated Ochre, abſorb it again, and become very clear and pellucid: But in two or three Days more, a thin black Scum, like to that on a ſmoaked Glaſs, riſes and adheres to the Inſide of the Neck and upper Parts of the Bottle. This Scum gradually grows thicker, and in a few Days more falls off in thin black Flakes, which ſubſide to the Bottom of the Bottle, and float with the leaſt Motion. In this Condition it will keep ſweet, and retain ſome of its Properties for many Years, as will be obſerv'd hereafter.

16. The Water when freſh taken up at the Spring, has a light, brisk, pungent, ſulphureous Smell, with ſomething ferruginous, tho' not ſo much as to make it diſagreeable.

17. This pungent, ſulphureous Smell, which is ſo perceptible the Moment it is taken up, is loſt in 6 or 8 Minutes time, if

openly expoſed to the Air; but it will retain a little of the Smell much longer, if it be kept in Bottles quite full, and, immediately when fill'd, cloſe ſtopp'd and ſecured from the Air.

18. The Water, when freſh taken up at the Spring, and deliberately taſted by a Perſon nicely diſtinguiſhing, has a light, quick, ſulphureous Taſte, with a ſtronger ferruginous or chalybeat one, as 'tis commonly called, and a certain Degree of a ſubtile, pungent Activity on the Tongue; but without any Tartneſs, or Acidity, or the fretting Cyder-like Briskneſs of the *Pyrmont* Water, or of the *Poubont* of *Spa*; but a more ſubtile, yet ſoft and penetrating Spirit, affecting thoſe who drink it to the Quantity of three Half-pints, haſtily one after another with a Giddineſs.

19. In taſting this Water, the Sulphur is firſt perceived, and next a much ſtronger Taſte of Iron; the firſt being more volatile, the laſt more permanent.

20. Theſe are the moſt obvious Qualities of this Water, when examined by our Senſes alone: I ſhall now proceed to relate the Effects of it, when tried with various Mixtures.

21. A Glaſs of this Water, containing about three Ounces, changes in leſs than a Minute from its natural Colour, to a beautiful deep

Purple or Amethyſt, with one Drop of Tincture of Galls made with Water.

22. The ſame Change happens with the *Powder of Galls*, or *Green Tea*, only the Colour is a Shade or two darker, and the Water more muddy with theſe.

23. Four Drops of the Tincture of *Logwood* turn the ſame Quantity of the Water, freſh taken up, (which muſt be always ſo underſtood, except the contrary is mentioned) immediately to a blackiſh Blood Red, and in about a Minute to a deep Blue, with a Shade of Purple.

24. Four Drops of the Tincture of *Sumach*, in the ſame Quantity of Water, do not at firſt produce any remarkable Change, but after ſtanding one Minute, turn it to a clear blackiſh Purple.

25. One Drachm of the Syrup of *Violets*, changes the Colour to a deep Graſs Green immediately, with a little Muddineſs.

26. Five Drops of a Solution of Silver in *Aquafortis*, give the like Quantity of Water a pale pearl Colour, which in two Hours turns to a blackiſh Grey; and in a Night's Time a Powder of this Colour is precipitated in a ſmall Quantity; but the *Phænomena* attending this Experiment, were not always the ſame, the Colours both at firſt, and on ſtanding, being often fainter than here deſcribed.

27. With a Solution of *Saccharum Saturni*, a whitiſh, milky, pearl Colour was produced, with ſomewhat of a browniſh Hue.

28. Spirit of *Hartſhorn*, or Spirit of *Sal Ammoniac*, cauſe no Alteration in its Colour; neither does a Solution of *Sublimate*, or of *Sal Jovis*, affect it.

29. *Ol. Tart. per deliquium*, changed it to a very faint pearliſh Colour; it afterwards became turbid, and precipitated a ſmall Quantity of a whitiſh yellow Powder; but the Change it produces is very little, and not always to the ſame Degree. Acids make a ſort of ſmall *Ebullition*, or rather a very ſingular inteſtine vermicular Motion, and loſe of their Acidity; one Ounce and half of this Water being ſufficient to deſtroy the Acidity of one Drop of the ſtrongeſt *Oil of Vitriol*.

30. The Water, freſh taken up, will not lather with Soap, but curdles: When its Ochre is precipitated, and it ceaſes to change Colour with Tincture of Galls [21.]. It readily mixes and lathers with Soap.

31. Milk boiled with this Water does not curdle in the leaſt, but acquires a ſoft, ſoapy Taſte: Mix'd with new Milk, it gives it an agreeable ſweetiſh Softneſs.

32. A Glaſs of the Water after it has been kept in an open *Florence* Flaſk fill'd to the Neck, for five or ſix Months, will change

to a fine red Claret Colour, with one Drop of the Tincture of Galls.

33. If it be kept in Bottles cloſe ſtopp'd and cemented, or ſecured from the Acceſs of Air with Oil and oiled Bladder, it will ſtrike near as deep a purple or amethyſt Colour with the ſame Proportion of Tincture of Galls, when kept eight or nine Months, as at firſt.

34. Secured in this manner, it retains a ſmall Degree of its ſulphureous Smell, tho' but little; in other reſpects it appears as above [14.].

35. But if the Flasks [33.] be not quite full, or if it is kept in a Veſſel where it has a larger Surface, it loſes its tinging Property [21.] in ſix or eight Hours time.

36. The Water, drank freſh at the Spring by an healthy Perſon of an ordinary Conſtitution, to the Quantity of three or four Half-pints, at firſt generally affects the Head, for a little time with a Giddineſs, as a Glaſs or two of Wine does; but this uſually ceaſes after a few Days Uſe: A greater Doſe has greater Effects, ſo as to occaſion ſome Degree of Temulency.

37. Tho' it is as cold as other Spring Waters, [15.] yet where theſe are apt to occaſion a Chillneſs in the Stomach, the *Lincomb* Water moſtly ſits light, and gives an agreeable Warmth to it.

38. The Water generally paſſes off very quickly by Urine, and keeps the Body temperate; to ſome it gives two or three Stools a Day, eſpecially at firſt uſing it; to others, it is apt to occaſion ſome Degree of Coſtiveneſs: It moſtly procures a quick Appetite, and ſtrong Digeſtion, raiſing and maintaining a great Flow of Spirits.

39. From hence we learn, that this Mineral Water, however homogeneous it may at firſt appear, ſpontaneouſly diſcovers in a ſhort Space of Time very different Parts. § 9. 10. 11. *&c.*

That it contains a large Quantity of elaſtic Air, [8.] a Sulphur, Part of which is very volatile and incoercible [17.] and another Part [15. 34.] more fixed.

That it alſo contains a very ſubtile, chalybeat Principle, [21. 22. 23. 24.] which, if the Water be kept in a Bottle very cloſe ſtopp'd, ſeems not to loſe much for ſome time, [32. 33.] but ſoon diſappears when it is expoſed to the open Air [35.].

And that it likewiſe contains a Quantity of an alkaline Earth [26. 27. 29. 31.]. What Proportion theſe bear to the whole Quantity of the Water, and to each other, will be examined into in the following Experiments.

SECT. III.

1. ON *June* the 8th 1738. five Pints of *Lincomb Spaw Water*, freſh taken up at the Spring, were immediately put into a clean Glaſs Retort, and a large Receiver adapted with the leaſt Delay poſſible, and the Junctures well covered with common Lute and Bladder over it: The Retort was placed in a Sand-heat by the Spring, and a moderate Heat ſupplied all that Afternoon, and the following Night; in the Morning about a Pint of Water was drawn into the Receiver.

2. The Veſſels were then brought home, and the Receiver taken off, when neither the Water in the Retort or the Receiver had the leaſt Smell or Taſte of Sulphur or Iron; neither of them turn'd purple with Tincture of Galls, nor green with Syrup of Violets, nor did the Water in the Receiver ſeem to differ from common Water diſtill'd, almoſt in any reſpect: For to one Part we put Tincture of Galls; to another Syrup of Violets; to a Third, *Ol. Tart. per deliquium*; all without producing any Change: To a Fourth we put a Solution of Silver; to a Fifth, a Solution of Sugar of Lead, both which gave it a faint pearliſh Caſt, tho' not much more than they uſually do to common Water diſtill'd.

3. Hence it appears, 1ſt, That the Water thus diſtilled from the *Spaw Water*, contains no Iron in it. 2dly, Nothing of an acid or alkaline Nature. 3dly, No ſtony, marly, or earthly Particles: But 4thly, ſome faint *Veſtiges* of Sulphur, tho' almoſt imperceptible: No other Properties appearing that render it different (as was obſerved above) from common Elementary Water diſtilled; nor have we any Ground to ſuppoſe it impregnated with ſuperior Virtues.

4. The remaining Water in the Retort was drawn off in a Sand-heat in five Days time, (in the Laboratory of my Friend Mr. *Thomas Havilland*, an able Botaniſt, and ingenious Apothecary) and left a dry Powder in the Bottom of the Retort, of a reddiſh Ochre or Cinnamon Colour, which weighed nine Grains; to which may be added four Grains more, for the Water uſed in trying if it would tinge, *&c.* and for what was left on the Sides of the Retort, or loſt in taking it out.

5. During the Operation ſome few Bubbles roſe in the Water when it began to grow warm; but the Receiver being near four times as large as the Retort, and the Luting exceeding cloſe, and almoſt dry, no Marks of any thing eſcaping appeared during the Operation.

6. Six Gallons of *Lincomb Spaw* Water were put into a low, broad, clean, well-tinn'd Copper Pan, and ſet over a gentle Charcoal Fire to evaporate. As ſoon as the Water began to grow perceptibly warm, it had loſt its tinging Quality, and the Ochre began to ſeparate and float in thick, red, orange-coloured Clouds in the Water, which rendered it muddy: Part of this Ochry Matter adhered to the Sides of the Pan in a Circle, about the Surface of the Water, as ſoon as it began to boil, which was frequently waſhed down and ſtirred, to prevent the Adheſion of the Ochre to the Pan: When the Water was reduced to about two Pints, it was put into a well-glazed earthen Pan, and ſlowly evaporated to Dryneſs; an exceeding fine, ſoft, dry Powder, of an Orange Ochry or Cinnamon Colour, was obtain'd, of a ſaline Taſte. This Powder, taken clean out of the Pan, and exactly weighed, was two Drachms and fifteen Grains: The Experiment was made with ſo much Care, that no more than three Grains at moſt of the fixed Contents could be loſt in the Operation.

7. By this Experiment it appears, that the fixed Contents of this Water are to the whole Quantity of Water in its natural State, as 1 to 2003 $\frac{1}{2}$, calling a Wine Pint of this Water, 12 Ounces, Apothecaries Weight;

that

that is, as 23 Grains to a Gallon, or near 3 Grains to a Pint. This Operation was repeated in a larger Quantity of Water, with the ſame Effect.

8. The *Reſiduum* in both theſe Operations was the ſame, *viz.* A fine ſoft Orange-ochre, or Cinnamon-coloured Powder (ſave that the *Reſiduum* in the Retort was ſomewhat brighter in Colour, as being free from the leaſt Duſt); both had a ſaltiſh Taſte, both an exceeding fine ſoft Powder, both Alkali's, and fermented ſtrongly with Acids, and were in every reſpect alike (the Separation of the Ochre in Clouds, when the Water became warm, only excepted): For evaporating the Water in an open Veſſel differs from that in a Retort in this reſpect: Here the Water continues clear, but will not tinge after it is warm: In that, *viz.* in an open Veſſel, it loſes its Clearneſs, and its tinging Property, at the ſame time.

9. The remaining Powder, which weigh'd two Drachms and fifteen Grains when perfectly dry, was mix'd in a *China* Cup with boiling hot diſtill'd Water, then filtred thro' Paper; more Water was pour'd on it two or three times till the Powder was become inſipid; the ſaline Liquors were all mixed, evaporated in a *China* Cup over the Fire till a Pellicle appeared on its Top, and then ſet in a cool Place for the Salts to ſhoot: Two Days

after, I found a clear reddiſh-brown coagulated Matter like Jelly, and a very ſalt reddiſh-brown Water ſwimming about it in the Cup, to which I put more hot diſtill'd Water, filtred it again, evaporated it to a Pellicle, and ſet it to cryſtallize: A few Days after, I found about 15 Grains of a reddiſh-brown coloured Salt in the Cup, of a very pungent, penetrating, lixivial Taſte, almoſt like the *Sapo Tartari*, or rather anſwering to the Deſcription which the Antients give of their *Nitrum* *.

10. The Quantity of Salt which this Water affords is very ſmall, in proportion to the aqueous Part, being no more than 1 to 18432, that is, as 2½ Grains to a Gallon.

11. The remaining Sediment or Powder, when ſeparated from the Salt, weigh'd two Drachms; this Powder was exceeding fine, and the ſame Colour as before Filtration, without Taſte, and appeared like true *Bole Armeniac* in fine Powder; two Drachms of it were put into a Crucible cloſe covered and luted, then roaſted in a common Fire an Hour and an Half, after which it was put into a Founder's Furnace, and kept in a ſtrong Heat for an Hour and an Half more.

12. During this Operation, an Hole was melted in the Side of the Crucible; when all was cold, the Crucible was opened, and

---

* *Vid.* Plin. *Hiſt. Nat.* l. 31. c. 10.

a ſolid, hard, black, vitrified Subſtance like Slag, or black Glaſs, was found adhering to its Bottom; this vitrified Subſtance being reduced to Powder, a Loadſtone being ſeveral times applied to it, about the 32d Part of a Grain of Iron was obtain'd from it.

13. Two Drachms more of the ſame *Reſiduum* were put into another Crucible, and a little Greaſe with it, to aſſiſt in fluxing the Iron, if it contain'd any: Another Crucible was inverted over it, and luted with very ſtrong Luting made of *Stourbridge* Brick, a little Wheat Flour, and the White of an Egg. This being firſt roaſted, and then put into the Furnace as before for an Hour and an Half, gave us a ſolid, hard Body, of a dark-brown Colour, weighing one Drachm, which being reduced to Powder, the Loadſtone was applied to it; but there was not the leaſt Particle of Iron found in it.

14. The Salt which I obtained from this Water did not ſhoot into Cryſtals of any regular Figure, but appeared porous and ſpongiform when examined by a Microſcope; and tho' ſome ſmall *Spiculæ* were obſervable, yet did not aſſume the regular Figure of any deſcribed Salt: It had a pungent, penetrateing, lixivial Taſte; and when expoſed to the Air, it run *per deliquium* in a ſhort Space of Time.

15. This Salt fermented ſtrongly with

Acids, and deſtroyed their Acidity in a certain Proportion, as the following Experiments more fully evince.

16. Six Grains of this Salt were diſſolved in three Ounces of common Water diſtill'd, and divided into ſix equal Parts: To one of them we put one Drachm of Syrup of Violets, which turn'd it to a Graſs-green Colour in a Moment. To another we put three Drops of Tincture of Galls, which made no Alteration: To a Third we put three Drops of Oil of Vitriol, which produced a ſtrong inteſtine Motion in the Water, and the Oil loſt its Acidity: To a Fourth we put three Drops of Solution of Mercury Sublimate, which cauſed very little Change: To a Fifth we put four Drops of a Solution of Silver in *Aqua-fortis*, which inſtantly turned it to a white milky Colour, with a faint muddy Yellow; and after ſtanding a few Hours, it let fall a good deal of fine white Powder, of a yellowiſh Hue, the Water above being clear: To a Sixth we put three Drops of Spirit of *Sal Ammoniac*; to which no Change enſued.

17. One Grain of this Salt was laid on a *China* Saucer, and two Drops of Oil of Vitriol were gradually, at ſome Diſtance of Time, dropp'd upon it; each of which cauſed it to hiſs with a violent Ebullition, but one Drop more added, produced no ſuch Effect.

18. One Grain of this Salt was put upon a red-hot Iron, upon which neither a Decrepitation, like Sea-ſalt, nor a Liquefaction, like Saltpetre, nor any Smoak or Smell enſued: It burned to a black Coal, of a ſtrong alkaline lixivial Taſte, and ſoon ran *per deliquium* when expoſed to the Air to cool; Two Drops of Oil of Vitriol, being put to it, cauſed a violent Ebullition with an hiſſing Noiſe.

19. This Salt, tho' kept very dry in a Phial cloſe ſtopp'd, became a ſoft, brown, ſaline Paſte, which had ſomething of a viſcid Nature in it.

20. It appears from theſe Experiments, that this Salt is neither a Marine Salt, nor a Nitre, like our common Nitre or Salt-petre, nor an Ammoniac Salt, but an Alkaline Lixivial one; which Kind of Salt is known to be a powerful Attenuant, Detergent and Deobſtruent, capable of promoting the thinner Secretions.

SECT. IV.

WE learn by Experiments, and particularly by thoſe made with the Air-pump, that there is more or leſs Air contained in all Water; but there ſeems to be much more of an elaſtic Fluid, which has all the Properties of Air, contained in the Water of ſeveral medicated Springs, eſpecially of thoſe which come under the Denomination of cold *Chalybeats*, than in others.

1. In order therefore to diſcover the Quantity of Air contained in a given Quantity of this Water, we filled a *Florence* Flask, containing two Pints, with the ſame Spaw Water, at the Spring; then having a Bladder well oiled on its Outſide, both to render it more pliable, and, if poſſible, to prevent the Eſcape of any ſubtile Matter through the Pores of the Bladder by filling them up; and having firſt diſcharged the Air contained in it by drawing it through my Hand, and twiſting it cloſely, we immediately introduced the Mouth of the Flask, whilſt under the Surface of the Water, into the Neck of the Bladder, and tied it very cloſe with a waxed Thread: We then placed the Flask on the Ground by the Spring, and untwiſted the Bladder, that it might receive the Air or Spirit, if any eſcaped out of the Water: In leſs than two Hours time the Bladder ſwelled, and appeared to be a fourth Part full of an elaſtic Fluid like Air, without the Application of any Heat more than what it received from the Ground, and external Air: We let it remain in this State about four Hours, in which time we frequently compreſſed the Bladder, beginning at the Mouth of the Flask, and twiſting it upwards, ſo as to collect all the

Air at the (now upper Part, but) Bottom of the Bladder, where it was diſtended to the Size of an ordinary Orange, or equal to ſix or eight cubic Inches, with an elaſtic Fluid like common Air.

2. By this Part of the Experiment it appears, that a conſiderable Quantity of a dry, ſubtile, elaſtic Fluid or Air, is contained in a looſe Manner in this Water, ſo as to be ſeparable from it ſpontaneouſly, without any additional Heat more than that from the common Air of the Atmoſphere; and that this Fluid flies off from the Water, with ſuch a Degree of Force as is able to diſtend the Bladder, whoſe Sides were compreſſed or ſqueezed together by the Weight of the Atmoſphere.

3. But in order to diſcover what this elaſtic ſubtile Fluid was, we took the Flask after it had ſtood thus four Hours, and ſqueezed the contained Fluid or Air into the upper Part of the Bladder, and tied it faſt with a waxed Thread; then unlooſing the Bladder from the Flask, and having ſome common Water mixed with Tincture of Galls ready in a Glaſs Veſſel, we immerged the Bladder, with its contained Fluid or Air, into the Bottom of that Veſſel, and forced out the Air thro' an Orifice made in the Bottom of the Bladder, which inſtantly roſe thro' the Water in Bubbles, without giving the leaſt red or pur-

ple Colour to it: But the Water in the Flask from whence the Air was collected, being mixed with a few Drops of Tincture of Galls, turned to as fine a purple or amethyſt Colour, as when freſh taken up at the Spring.

4. This Experiment was repeated ſeveral times, and we found, that the Water did not afford the ſame Quantity of this elaſtic Air at all times alike: Sometimes it gave about three cubic Inches of Air, at other times eight or ten; and ſometimes by letting it ſtand, the Water would abſorb half of that Air, at other times much leſs; and it was obſervable, that the Water, upon diſſolving its Ochre again, always generate this elaſtic Air in as large, and ſometimes in a larger Quantity than it did at firſt when freſh taken up at the Spring, as the Experiment *A* will ſhew.

5. Three *Florence* Flasks were filled at the ſame time with this Water; one with a Bladder fixed over it, whilſt under Water, as in the preceding Fxperiment. This I ſhall call *A*.

Another was immediately covered with a little Oil, and over this was tied a Piece of oiled Bladder, *B*.

A third was only well cloſed with oiled Bladder, *C*.

The Changes which theſe were obſerved to undergo, are as follows:

6. At the End of two Hours, each of them began to loſe their Tranſparency, and appeared of a faint pearl or wheyiſh Colour.

7. This Change of Colour gradually increaſed in all, and became yellowiſh, but neither ſo ſoon, nor with ſo much of the Orange, as where the Air is more freely admitted.

8. In about five Hours time there was collected ſo much Air in the Bladder fixed to the Top of *A*, as filled the Space of three or four cubic Inches. After ſtanding twenty-two Hours, each of them began to let fall its Ochre, which being collected in the Appearance of *Flocculi*, floated in the Water, and gradually ſubſided to the Bottom.

9. On the ſecond Day from filling the Flasks, the Bladders which covered *B* and *C* were ſo much diſtended, that we judged it neceſſary to add another Covering of oiled Bladder to each, to ſecure againſt a Rupture.

10. On the third Day all the Ochre which would ſeparate in this State, was ſubſided, tho' not much more than half the Quantity of Ochre fell, which uſually does when the Water is expoſed to the Air, tho' *A* let fall as much more as either *B* or *C*, probably from the leſs Preſſure it underwent than the other two.

4th, 5th, 6th Days, the Water upon the Ochre in *A*, grew very clear; in *B* and *C* ſomething clearer than on the preceding Days.

11. On the 7th in the Morning the Ochre in *A* began to diſſolve, which before Night was completed: The Air which had filled the Bladder before, was abſorbed; but a freſh Quantity equal to a large Orange, or 9 or 10 cubic Inches, was again produced.

12. To the twelfth Day the Clearneſs in each of them increaſed, and in *A* an uncommon Brightneſs appeared like that of poliſhed Steel, or a Diamond.

13. On the twelfth, a thin black Scum like Smoak began to appear, ſticking to the Inſide of the Neck of the Flask *A*.

14. On the thirteenth the Ochre in *B* began to diſſolve, but more ſlowly than in *A*, the Solution not being completed in leſs than two Days; from this time it grew clear and reſplendent, as was noted in *A*.

15. On the ſeventeenth and eighteenth the like black Scum began to appear in *B* as had ſhewed itſelf in *A* on the twelfth.

16. This Scum, or ſmoaky Skin, gradually increaſing in Thickneſs, began to fall off in black Flakes, and ſubſided in the Water, tho' not quite to the Bottom; but ſo as to float up and down the Water with the leaſt Motion.

17. This Skin had ſubſided in *A* about the 25th, and the Water above it become quite clear; the ſame happened in *B* ſoon after.

18. But in *C* the Solution of the Ochre did not begin before the 45th Day, and ended in 2 Days; after which it grew very clear as in the others, till the black Scum roſe, peeled off, and ſubſided as in the reſt.

19. It muſt be obſerved, that the Bladder which covered this laſt, on the 18th was pierced by Accident with a Needle, and no other Means uſed to cloſe the Orifice than rubbing the Bladder with a little Oil.

20. From hence we may obſerve, that tho' the three Flasks were all filled at the ſame Time, yet, excepting the Time of depoſiting their Ochre, every ſubſequent Change was different in each as to Time.

21. The Air in *A* was leſs compreſſed, and conſequently the inteſtine Motion of the Water more free, than in *B*; the Effect of which was a ſpeedier Diſſolution of the Ochre. The total Eſcape of the Air in *C*, and the Loſs of ſomething elaſtic by that means, which was neceſſary to bring about the Change, probably was the Reaſon why the Ochre in this continued ſo long undiſſolved: However, the ſame Changes happened to each, tho' at different Periods of Time.

22. Theſe were kept in this Condition during ſome Months, when being opened, one Drop of the Tincture of Galls was put to a Glaſs of each, and all of them changed

to as fine an amethyſt Colour as if freſh taken from the Spring.

23. The Flasks being then left open, and half full, the Water firſt changed to a wheyiſh yellow Colour, and precipitated its Ochre almoſt in the ſame Quantity as when freſh taken from the Spring, and expoſed in like manner to the Air.

24. We afterwards ſeparated ſome of the black Flakes by the Filtre, and laid them on Paper to dry; they changed from a Jet-black to an Orange Ochre in a few Hours. From hence it appears, that the Flakes are not the Sulphur alone; but the greateſt Part is Ochre made buoyant by the adhering Sulphur, which being diſſipated by the Air, leaves the Ochre in its natural Form.

25. As this is a very uncommon *Phænomenon*, I have preſumed upon the Reader's Patience, for the ſake of Exactneſs, in relateing it; this being the only Water I have yet met with, which re-diſſolves its own Sediment.

26. From theſe Experiments it appears, that there is a conſiderable Quantity of a dry, ſubtile, elaſtic Fluid, which has the Properties of common Air, contained in this Mineral Water, in ſo looſe a manner, that it is eaſily and ſpontaneouſly ſeparated from it without any additional Force; which, whilſt mixed with the Water, muſt be very much compreſſed and condenſed in the Interſtices

of the Water; ſince the Quantity thus ſeparable from one Quart, can fill a Space equal to nine or ten cubic Inches, when the *Moles*, or Bulk of the Water in the Bottle from whence it came, is not at the ſame time perceptibly diminiſhed: Or that a large Quantity of Air is immediately generated and rendered elaſtic, which was not ſo before.

27. For if we conſider the Effects of that Ebullition or Conflict which inſtantly ariſes upon the Mixture of oppoſite Principles together, ſuch as an Acid and Alkali, and reflect on the Quantity of Air which is produced by that Agitation, we ſhall have ſome Reaſon to believe, that this Quantity of new elaſtic Air is the Conſequence of ſuch a Conflict, and that it is not a ſimple Diſengagement of it from the Water. It is therefore worth while to conſider, whether that elaſtic Vapour, or ſubtile fugitive Fume, called a *Mineral Spirit*, is any other than this agitated elaſtic Air forcibly ſpringing from the Water, and carrying along with it ſome of the moſt ſubtile Particles of the Sulphur and Iron, which affect the Organs of Smelling, and ſtrike againſt the Tongue with a ſenſible pungent Briskneſs in taſting it.

28. The abſolute Incoercibility of this ſubtile Mineral Spirit, and the Production of a pungent Smell and Taſte upon mixing any of the ſtronger Acids and Alkali's together, would induce one to believe, that it is only

the immediate Production of the Conflict above-mentioned; and ceaſes to exiſt ſo ſoon as the exploſive Force, with which the ſmall diſtended Air-bubbles dilate, is ſpent; the mineral Spirits expire, or ceaſe then to act, and are no more to be collected, than the elaſtic Air produced in the Exploſion of Gunpowder.

29. The Experiments, and repeated Endeavours, which have been made with all the Accuracy and Contrivance poſſible, to collect theſe ſubtile Spirits, having hitherto proved abortive; are a Diſcouragement, I confeſs, to any more Attempts in Search of them: And if their Exiſtence for any Time after the total Exploſion and Eſcape of the elaſtic Air cannot be demonſtrated, it will ſave us the Trouble of making any further Inquiry. Our Experiments render this negatively dubious, and collateral ones ſeem to ſtrengthen the Suſpicion.

30. Having therefore ſhewn by the preceding Experiments, that this Mineral Water contains a conſiderable Quantity of an elaſtic Air, which is concealed for ſome time either in an unelaſtic or in a compreſſed State (tho' much leſs than is contained in the *Pyrmont* and *German Spaw* Waters); and having rendered it probable, that the Exploſion of this active elaſtic Air is either the mineral Spirit itſelf, or the Vehicle of the ſubtile mineral Principles contained in all theſe Wa-

ters; I ſhall now proceed to inquire into the Nature of the chalybeat Principle contained in this Water, and relate ſome Experiments made, with an Intention to diſcover, whether the Iron, which it contains, is really reduced to a volatile State according to the common received Opinion; or, as others think, it only diſappears by a new Combination of its mineral Principles.

SECT. V.

1. BEFORE I proceed to the Experiments themſelves, it may be neceſſary to obſerve to ſome Readers, that it is found, from repeated Trials, that if the Water of any Spring becomes red, purple, or black, with the Powder or Tincture of Galls, or any other aſtringent Vegetable put to it, we may conclude, that that Water contains a ſubtilized Iron or its Vitriol diſſolved.

2. For if we put a Piece of clean poliſhed Iron into common Water, and a proper Quantity of Powder of Galls; the Water, upon ſtanding, will gradually loſe its own Colour, and acquire firſt a light Red, then a Purple, and laſtly a Black one. This Change of Colour therefore will be a certain Mark of the Preſence of a diſſolved or ſubtilized Iron,

3. The *Lincomb Spaw* Water, when freſh taken up at the Spring, has a quick, pungent, ſulphureous Smell, mixed with a leſs perceptible chalybeat one; both which it loſes in eight or ten Minutes time, by ſtanding in an open Veſſel; and ſooner, if ſet upon the Fire.

4. It has alſo a remarkable ſtrong, quick Taſte of the Vitriol of Iron, with a much leſs perceptible one of the Sulphur, which are both very ſenſibly diminiſhed in two Hours time, and almoſt vaniſh in eight, in an open Veſſel; and are wholly loſt in a few Minutes, if placed over the Fire.

5. One Drop of the Tincture of Galls turns a Glaſs of this *Spaw Water*, freſh taken up at the Spring, to a beautiful deep purple or amethyſt Colour in a Minute's time; but a Glaſs of the ſame Water, after it has ſtood in the open Air eight Hours, will not give any purple Colour with it.

6. Eight Wine Glaſſes were filled at the Spring with three Ounces of the *Spaw* Water each; one Drop of the Tincture of Galls was immediately put into the firſt Glaſs, which we ſhall call N° 1. and a Drop was likewiſe put into the other ſeven Glaſſes, at the End of each Hour: The Water in N° 1. turned to a fine amethyſt Colour, as above; that in N° 2. which had the Drop added to it after it had ſtood one Hour, was more pale and faint-coloured; N° 3. was ſtill paler,

with a muddy Red; and each Glaſs gave a more faint, pale, muddy, reddiſh Colour, as its contained Water changed to a wheyiſh ochry Colour, by ſtanding before the Tincture of Galls was put to it; N° 6. ſhewed no Diſpoſition to change in leſs than half an Hour, when it turned to a muddy Colour, with a faint dark bluiſh Caſt; N° 7. was ſtill leſs ſo; and N° 8. did not change at all, but remained of a muddy, wheyiſh, ochre Colour, as it was before the Drop of Tincture of Galls was put into it; till, after ſtanding ſome Hours, it became more muddy, with a very faint bluiſh brown Caſt.

7. From hence it appears, that this Water, when it is freſh taken up, contains a conſiderable Quantity of Iron, which it ſhews no Signs of after the Water has ſtood about eight Hours in open Glaſſes: Whence we conclude, that this Iron is either volatile, and flies off, or elſe is ſeparated from the Water, and precipitated with, or in the Form of Ochre.

8. I mixed ſome of this Ochre, and alſo ſome of the *Reſiduum* after Evaporation, [§ 3. *p*. 4] with a little pure Water in ſeparate Glaſſes, and then put one Drop of Tincture of Galls to each; but no Change of Colour appeared in either of them.

9. To a Glaſs of the clear Water, from whence the Ochre had been precipitated, [§ 4. *p*. 5:] I put Tincture of Galls ſeveral

times, in different Quantities, but without producing any Change in its Colour.

10. Hence we learn, that the tinging Cauſe in this Water neither appears in the Sediment, nor in the *Reſiduum*, [§ 3. 4.] nor in the Water from whence the Sediment was obtained by a ſimple Precipitation, [§ 4. 5.] nor in that drawn from it by Diſtillation, [§ 3. 2.] nor yet in the elaſtic Air which it contains [§ 3. 3.]: Wherefore we conclude, that this tinging Cauſe, *viz.* its chalybeat Principle, is either exceeding ſubtile and fugitive, as the ferruginous Smell and Taſte of this Water ſeem to indicate, and the preceding Experiments negatively demonſtrate; or that the chalybeat tinging Principle is by ſome new Combination precipitated.

In order to diſcover which of theſe is the Caſe, I made the following Experiments:

11. Six Glaſſes, each containing three Ounces, were filled with the *Spaw* Water freſh taken up. To one was put *Ol. Tart. per deliq. gut. j.* to another *gut. ij.* to another *iij.* to the fourth *iv.* to the fifth *v.* to the ſixth *gut. vj.*

To each of theſe were put two Drops of the Tincture of Galls; the firſt Glaſs turned to an amethyſt Colour, the ſecond a reddiſh Purple, the third a faint Red, the fourth a ſtill fainter and muddy reddiſh Bluſh, the fifth and ſixth only put on a ſomething browner Caſt from the Colour of the Tincture itſelf, and ſhewed a pearliſh Muddineſs.

12. Into a like Number of Glaſſes of *Spaw Water* were put a like Number of Drops of Oil of Vitriol, increaſing progreſſively as in the laſt Experiment; to each of theſe were put two Drops of Tincture of Galls; none of them changed Colour, but remained clear and unalter'd.

13. I put half a Drop of Oil of Vitriol into the ſame Quantity of the *Spaw Water*; two Drops of the Tincture of Galls gave it a faint Purple.

Half an Hour after, I added to it a few Drops of Oil of Tartar, when it changed from a faint Purple to a fine amethyſt Colour.

14. To a Glaſs of the *Spaw Water* I put Oil of Tartar ſix Drops, Tincture of Galls two Drops, and half an Hour after, Oil of Vitriol three Drops; upon this a faint purpliſh Caſt appeared.

15. To another Glaſs of freſh Water I put Oil of Vitriol two Drops, Tincture of Galls two Drops; the Water remained clear and colourleſs: Half an Hour after, ſix Drops of Oil of Tartar were put to it, which produced a deep Amethyſt.

16. Into a Bottle which had a Pint of freſh *Spaw Water* in it, I put ſix Drops of Oil of Tartar, and ſtopped it cloſe; the

Day following it let fall its Ochre in the uſual Quantity, but in ſmaller compacted Particles, not in *Flocculi*.

It ſtood thus 18 Days without re-abſorbing its Ochre: I put 10 Drops of Tincture of Galls to it; no Alteration of Colour appeared; the next Day it was changed to a deep Sea-green: I added ſix Drops of Oil of Vitriol, which at firſt produced no Change; but upon ſhaking it, it inſtantly gave a Bluſh of Purple on its Surface, which diſappeared as quick as Lightning, and left it as green as before.

17. When the Water is turned to a deep Purple with Tincture of Galls, three or four Drops of Spirit, and a leſs Quantity of Oil of Vitriol, will totally deſtroy its Colour; a few Drops of *Ol. Tart.* will recover it again; and this will ſucceed by Turns for ſeveral times.

18. If the Oil of Tartar is firſt dropp'd in, and next the Tincture of Galls, laſtly the Acid, this Experiment ſcarcely ſucceeds, the Colour produced being very faint, nor will it appear oftener than once; but if the Acid is firſt added, it will afford its Purple very lively and very often; but if the Tincture of Galls be put in ſome time after the *Ol. Tartar* has been added, it will afford no Change in Colour.

19. To 43 cubic Inches of freſh *Spaw Water*, 20 Drops of Tincture of Galls were immediately added: After the deep purple

Liquor had ſtood 24 Hours in a Bottle cloſe corked, it was poured into a Baſon, that it might let fall its Contents more readily: After ſtanding a few Days, it had let fall a thick purple Sediment; the Water was filtred through a Paper, firſt accurately weigh'd; more Tincture of Galls was added a ſecond and third time, till it precipitated no more: The filtring Paper, and its purple Contents, were carefully dried, and then weighed, when it had acquired $5\frac{1}{2}$ Grains; from whence deducting one Grain for the Extract of the Galls, (for ſo much I found it by weighing a Piece of Paper, and dropping 60 Drops of Tincture of Galls into it, and weighing it when dry) there remain $4\frac{1}{2}$ Grains of a black Ochry Sediment from $1\frac{1}{3}$ Pint of Water.

20. At the ſame time we put a like Quantity of the *Spaw Water* without the Tincture of Galls into a Baſon, leaving it ſeveral Days to ſeparate its Ochre, when it was filtred, carefully dried, and weighed as before; by this Proceſs we procured 2 Grains of a yellow Ochre in fine Powder.

21. I took two Glaſſes of equal Capacities, and equal Surfaces: Into one I put 12 cubic Inches of *Spaw Water*, into the other 12 cubic Inches of a very light Spring Water, and weighed them exactly equally cold, on a hot dry Day at 11 o'Clock, and let them ſtand in a dry Room.

At 12	the *Spaw Water* had loſt	*gr. iij.*
	the Spring Water	*gr. ij.*
At 1	the *Spaw Water*	*gr. vij.*
	the Spring Water	*gr. v.*
At 2	the *Spaw Water*	*gr. xiij.*
	the Spring Water	*gr. xj.*
At 5	each had loſt	*gr. xviij.*

To account for the two Waters coming to the ſame Standard at laſt, it will be neceſſary to obſerve, that a variegated Pellicle, forming itſelf on the Surface of the *Spaw Water* after it had been expoſed to the Air for ſome time, prevented it from exhaling in an equal Proportion to the Spring Water, tho' the Pellicle was frequently broke.

21. Hence it appears, Firſt, That the Degree of Purple which a mineral Water ſtrikes with Tincture of Galls, is not always a certain Indication of the Quantity of Iron it contains, becauſe the greater or leſs Quantity of Acid which exiſts in that Water or is added to it, may increaſe or diminiſh the Colour, 12. 13. 15.

22. Secondly, That it is owing neither to the total Eſcape, nor abſolute Deſtruction of any Principles which this Water contains, that it ceaſes to change Colour with Tincture of Galls, after it has ſtood ſome time; ſince if we accurately adjuſt the Proportions of Oil of Vitriol and Oil of Tartar, we can alternately obliterate and retrieve the Colour

ſeveral times (14, 15, 16.); which would not happen, was the Iron either totally deſtroy'd, or had eſcap'd.

Thirdly, But that the volatile Sulphur in its Eſcape, (3.) and the Exploſion of the elaſtic Air, (Corol. Sect. IV.) carry off ſome Particles of an highly ſubtilized Iron, ſeems unqueſtionable, tho' at the ſame time a larger Quantity may remain in the Water under a different Appearance. For, the Acid which ſupported the Iron, being more ſtrongly attracted by the alcaline Earth than the Iron, precipitates this in the Form of Ochre: For it is a well-known Fact in Chemiſtry, that a Body may be inviſibly ſuſpended in a *Menſtruum*, but will become viſible and ſubſide upon adding ſome other Body, betwixt which and the *Menſtruum* there is a greater Affinity than betwixt the *Menſtruum* and the firſt diſſolved Body.

23. It appears then, that this Water contains a large Quantity of elaſtic Air, a volatile Sulphur, and a Portion of Iron, ſome Particles whereof are ſo far ſubtilized as to be capable of being carried off with that Air; all which together, as they have ſome Degree of Pungency, and fly off from the Water, may not improperly be called a *volatile mineral Spirit*.

And that it alſo contains a more fixed Iron and Sulphur, whoſe Quantity is not eaſily determinable, as it is mixed with an inert Ochre, which are all together in the Proportion of 23 Grains to a Gallon, or three Grains to a Pint.

Laſtly, an active alkaleſcent Salt in the Proportion of $2\frac{1}{2}$ Grains to a Gallon, in a Vehicle which differs in nothing from common elementary Water.

24. The Reader may perhaps expect here a circumſtantial Account of the Medicinal Virtues of the ſeveral component Parts of this Water, in a ſeparate State; but ſuch an Account would contribute little to inform him of the genuine Effects of the Water when drank freſh at the Spring; ſince in all Waters, where the moſt active Principles are ſo exceeding ſubtile as in this, we muſt look for its Medical Virtues in the whole Aggregate, and not in any one of its ſeparated Parts.

A chemical Analyſis of this Water, carefully compar'd with that of ſome others, whoſe Virtues are well known, will inform and aſſiſt us much more in determining concerning its Uſes and Effects by Analogy. I ſhall therefore proceed to compare this with ſome other mineral Waters, and endeavour to ſhew by Experiments wherein they agree, and wherein they materially differ.

SECT. VI.

1. THE purging Waters of *Harrigate*, *Croft*, and ſome others, ſeem to have more Sulphur in them than this has, and ſmell ſtronger of it; but they have no Steel.

2. The chalybeat Waters of *Harrigate*, *Aſtrop*, and *Tunbridge*, have very little or no Sulphur; and their chalybeat Principles are neither ſo light, nor in ſo great a Quantity, as in the *Lincomb Water*.

3. Neither the Waters of the *Croſs*, *Hot*, or *King's Bath*, ſeem to contain more than one tenth Part of the Steel which the *Lincomb Water* has, tho' the Steel which is contain'd in all theſe, ſeems to be equally ſubtile; and the *Lincomb Water* contains a much greater Quantity of Sulphur than any of the *Bath* Waters, even than the *Hot Bath Water*, which has more Sulphur than either the *Croſs* or *King's Bath*; neither have I yet met with any mineral Water with which it ſeems to agree ſo much as with that of the *Geronſter* at *Spa*.

4. The great Quantity of Iron and Sulphur which the *Lincomb Water* contains, and the great Similitude in Smell and Taſte which I found this Water to have to that of the *Geronſter*, (its pungent vinous Spirit only excepted) induced me to examine and compare it with the *Pyrmont*, *Pouhont*, and

Geronſter Waters in the following manner; the Effects and Appearances of which are here exactly and faithfully related.

5. We carried a Bottle of *Pyrmont*, and a Bottle of *Pouhont* (*German Spaw*) *Water* to the Spring at *Lincomb*, and put one Drop of the Tincture of Galls into a Glaſs of each of theſe Waters: The *Lincomb Water* turn'd to a beautiful clear Purple in a Minute's time, and gradually changed to a deep amethyſt Colour: The *Pyrmont Water* turn'd purple, with a muddy Caſt, in two Minutes time: The *Pouhont Water* began to change, in three Minutes, to a clear purple Colour, and in a few Minutes more turn'd to a deep Amethyſt, like the *Lincomb Water*.

6. To the ſame Quantity of each of theſe three Waters we put one Drachm of Syrup of Violets: The *Lincomb Water* turn'd to a light Graſs-green immediately, and gradually grew deeper: The *Pyrmont Water* remain'd the Colour of the Syrup for ten Minutes, and in fifteen Minutes changed to a faint Green, and in half an Hour to a light muddy Graſs-green, but not ſo deep as the *Lincomb Water*: The *German Spaw Water* did not change till after fifteen Minutes, and then turn'd to a faint Sea-green Colour, and in one Hour's time was a little heighten'd, but not near ſo much as either of the former.

7. We put four Drops of the Tincture of Logwood into a Glaſs of each of theſe

Waters: The *Lincomb Water* turn'd to a deep Blue preſently; which Colour gradually increaſed, with a faint purple Caſt: The *Pyrmont* and *German Spaw Water* chang'd to the Colour of old *Mountain* Wine, and in five Minutes began to look a little blue, and in ten Minutes more became almoſt like the *Lincomb Water*, tho' not quite ſo deep a Blue.

8. To a Glaſs of each of theſe Waters we put five Drops of Oil of Tartar *per Del.* The *Lincomb Water* turn'd to a whitiſh pearl Colour in a Moment, and continued ſo: The *Pyrmont Water*, at firſt, turn'd to a whitiſh pearl Colour alſo, but in leſs than a Minute became clear again, and continued ſo: The *German Spaw Water* did not change its Colour in the leaſt. In a little Time after, we put 25 Drops more of the Oil to each Glaſs: The *Lincomb Water* was a very little whiter than before: The *Pyrmont Water* turn'd to a milky White, and curdled like Soap in hard Water; and after ſtanding two Hours, let fall a whitiſh Powder with a yellow Circle about it: The *Lincomb* precipitated a whitiſh yellow ochry Powder: The *German Spaw Water* remained clear as before.

9. We put ſix Drops of a Solution of Silver in *Aqua-fortis* into a Glaſs of each of theſe three Waters: The *Pyrmont* turn'd to a pale pearl Colour the firſt; *Lincomb* the

next; and the *German Spaw Water* laſt; and in two Minutes time they were all three of the ſame whitiſh Colour, but the *Lincomb* was the cleareſt: In two Hours time they all changed to a dark-blue Grey, and were a little muddy, and then put down a blackiſh-grey Sediment.

10. Having ſome Bottles of freſh *Geronſter Water* ſent me, which were carefully cover'd with Oil, cloſe ſtopped, cemented, and tied over with Bladder on the Spot, I put ℥iij of the *Geronſter Spaw Water* into one Glaſs, and ℥iij of *Lincomb Water,* at the Spring, into another, and then put two Drops of Tincture of Galls into each of them: The *Lincomb Water* turn'd to a fine Purple in a Minute, and gradually came to a deep Amethyſt in about 15 Minutes time: The *Geronſter Water* began to turn purple in about three Minutes, and gradually came to a deep amethyſt Colour in twenty; and in one Hour's time they were both of the ſame amethyſt Colour. The *Geronſter Water* had ſeveral Air-bubbles adhering to the Glaſs, which the *Lincomb Water* had not.

11. To the ſame Quantity of each of theſe Waters we put ten Drops of Tincture of Sumach. The *Lincomb Water* changed to the Colour of a brown *Kerry* Stone in a Minute; and in a few Minutes more to a deep-bluiſh Purple, with a faint reddiſh Caſt:

The *Geronſter Water* remained clear almoſt ten Minutes, and then turn'd to a brown *Kerry* Stone Colour, and in three Minutes more to a deep bluiſh purple; and in one Hour's time they were both exactly of the ſame Colour, *viz.* a purple.

12. Five Drops of a Solution of Silver were put into a Glaſs of each of theſe Waters, and they both changed to a light clear pearl Colour in a Moment, which by ſtanding acquired a little purple blackiſh Caſt.

13. Two Glaſſes of the ſame Waters had one Drachm of Violets put to each of them. The *Lincomb Water* turn'd green in leſs than a Minute's time, and gradually chang'd to a deep Graſs-green: The *Geronſter Water* changed in about five Minutes time to a pale Green, and gradually grew deeper, but had a little more of the Sea-green than the *Lincomb Water* had.

14. A Glaſs of each of theſe Waters had five Drops of a Solution of Mercury ſublimate in Water put to them, and they both remained clear.

Two Glaſſes with ten Drops of Oil of Tartar *per del.* in each, turn'd to a very faint whitiſh pearl Colour.

15. Five Drops of a Solution of Sugar of Lead were put into a Glaſs of each of theſe Waters. They both changed in a Moment to a milky whitiſh Colour, with a browniſh

Caſt, and by ſtanding put down a Sediment of a yellowiſh dirty white Colour.

16. Into a Glaſs of each of theſe Waters I put five Drops of the Tincture of Rhubarb: They were both of the ſame Colour, and then changed to the Colour of a brown *Kerry* Stone; the *Geronſter* had juſt a perceptible yellowiſh Shade more than the other.

17. Finding this great Similitude between theſe two Waters, ſave that the *Lincomb Water* was freſh taken up at the Spring; whereas the *Geronſter Water* had been in Bottles whilſt it was brought from *Spa* hither, I took a Bottle of *Lincomb Water*, which had ſtood with Oil and Bladder cloſe tied over it ſixty Days, and a Bottle of the *Geronſter Water*, which had been kept in the ſame manner, and put two Drops of Tincture of Galls into a Glaſs of each of them: The *Lincomb Water* turn'd to a purple Colour in a Minute's time, and gradually grew deeper for five Minutes: The *Geronſter Water* turn'd purple in five Minutes time, and gradually became deeper for an Hour; after which they both remained of the ſame beautiful deep amethyſt Colour.

18. Five Drops of a Solution of Silver were put into a Glaſs of each of theſe Waters: They both turned to a beautiful Oriental pearl Colour in a Moment, and continued ſo for 15 Minutes, and then be-

came a little clearer; and by ſtanding two Days they both put down a ſmall Sediment of a darkiſh blue grey Colour.

19. Into a Glaſs of each we put a Drachm of Syrup of Violets: The *Lincomb Water* turn'd to a muddy Graſs-green Colour in a Minute, and gradually changed to a deep one: The *Geronſter Water* turn'd to a muddy Sea-green, and by ſtanding gradually changed to a deep Graſs-green Colour, much the ſame with the *Lincomb Water.*

20. We put ſix Drops of a Solution of Sugar of Lead into a Glaſs of each of theſe Waters. They both changed to the Colour of Mother of Pearl, or rather to that of a clear *Onyx*, with a browniſh white Caſt, and in two Hours time precipitated a ſmall Quantity of a Powder, which by ſtanding aſſumed a whitiſh-yellow Colour in both, but a very little more of the ochry Colour in the *Lincomb* Water.

21. The *Lincomb Water* has the ſame kind of fixed alkaline red Salt, as the *Geronſter Water* has, and depoſits an orange-colour'd Ochre by ſtanding in an open Veſſel, as the *Pyrmont*, *Pouhont*, and *Geronſter Waters* do.

22. And it appears from all theſe Trials, and the preceding Experiments, that the *Lincomb Spaw Water* is impregnated with the ſame mineral Principles which the *Geronſter Spaw Water* is, and appears to have

as

general is from half a Pint to a Quart or three Pints, in the Morning, divided into three or four Draughts, at the Diſtance of half an Hour between each Draught, with ſuitable Exerciſe; and in moſt Caſes half a Pint at Bed-time.

6. When this mineral Water is drank in this Manner, and in theſe Quantities, it generally, tho' drank cold, gives an agreeable Warmth to the Stomach in a few Minutes time, ſits light, creates a keen Appetite, and a good Digeſtion, remarkably raiſes the Spirits, and paſſes off freely and quickly by Urine.

7. Hence it is evident how well it is adapted to the Cure of thoſe Diſeaſes which proceed from Obſtructions in the glandular Parts and minute Veſſels of the Body, not attended with an immediate Inflammation of thoſe Parts: And it is no leſs evident, that this includes the major Part of chronical Diſeaſes.

8. Saying thus much would have been ſufficient for the Gentlemen of the Faculty; but there are others who perhaps may read this Eſſay, for whoſe Advantage it is neceſſary to be more explicit, and to mention ſome of thoſe Diſeaſes in the Cure of which this mineral Water is found to be efficacious.

In Diſorders of the Stomach and Bowels ariſing from a Loſs of Appetite and Indigeſtion, Diſeaſe call'd for Aſſiſtance not likely to be procured from them, I have not ſcrupled to recommend the *Lincomb Water* at that Seaſon of the Year.

3. The moſt proper Time of the Day for drinking any mineral Water, is eſteemed to be in the Morning before Breakfaſt; the Stomach being then empty, the Waters enter the Blood with the leaſt Diminution of their Virtues; the Application of the corroborating mineral Principles of the Fibres of the Stomach and Inteſtines, is likewiſe more immediate, which doubtleſs is of very great Conſequence, and perhaps the primary Cauſe of all thoſe good Effects which follow the proper Uſe of chalybeat Waters.

4. A Glaſs of ſuch Waters as are not purgative, but act as Alteratives or reſtorative Strengthners, taken at Bed-time, is no leſs beneficial; they ſtrengthen the Stomach, aſſiſt the Digeſtion, mix with the Blood, and promote the thinner Secretions without being diſturbed either by the Paſſions of the Mind, or Exerciſe of the Body; nor are they found to be of leſs Uſe, if a Glaſs or two be taken a few Hours after Dinner.

5. The Quantity and Length of Time muſt be varied according to the Age, Conſtitution and Strength of the Patient, and the Nature and Cauſe of the Diſeaſe; and conſequently muſt be very different in different Perſons. But we may ſay, the proper Quantity in

general

icterical Complexion, or what is uſually called a broken bloated Conſtitution, they ſtrengthen and corroborate the Veſſels, invigorate the Motion of the Blood, and increaſe the Secretions, and ſo carry off theſe Diſorders, and reſtore the Conſtitution more than the *Bath Waters* do; and it is perhaps owing to the ſame Cauſe, that they are found to be effectual in bringing the *Anomalous Gout* to be regular, when the *Bath Waters* have failed.

Externally uſed, they deterge, cleanſe and heal ſcrophulous and other old Ulcers, dry up ſharp acrid Humours, and heal Eruptions and ſcurfy Foulneſſes of the Skin: Some Inſtances of its Effects I have here ſubjoin'd.

HIST. I.

THomas Harley of *Whitſtable*, near *Canterbury*, aged 48, was ſeized in *September* 1736. with a violent Rheumatiſm, with great Pain, and inflammatory Swellings, in his Back, Arm, Leg and Thigh, which chiefly affected his Left Side, and continued for Three Months: By Bleeding, and other Remedies, his Pains abated; but his left Arm and Leg remained immovable and uſeleſs, with ſome Pain; but by bathing in the Sea, he recovered the Uſe of his Limbs at that Time. In *September* 1737. he was ſeized again in the ſame manner, and continued ſo till *March* following: In this Time he took various Medicines without much Relief, and being in low Circumſtances, he could not procure proper Aſſiſtance; the Pain and Swelling ſtill continued, but in time became ſoft, pale, and more of the œdematous kind, without any Inflammation. He continued thus in inceſſant Pain, for the Space of a Year and an half; he ſlept little, a violent Cough ſeized him, his Appetite decayed, he was extremely emaciated, and his Strength declined every Day: In this Condition he was brought to *Bath*, in the latter End of *March* 173$\frac{8}{9}$. he drank the *Bath Waters*, and bathed in them in the uſual manner for Six Weeks, without any Advantage, but rather with an Increaſe of his Pains, from a Coſtiveneſs which he apprehended the *Bath Waters* cauſed or increaſed: He had a Swelling on the Inſide of the Joint of the Left Knee, as large as half a Peny-Loaf, which was exceeding painful, and obliged him, when he attempted to move, to ſet the Side of his Foot forward, inſtead of his Toes. He had another protuberant Swelling as large as an Hen's Egg, on the Inſide of the Wriſt of his Left Arm, juſt above the Joint: Theſe Swellings were white and ſoft, but very painful, and fluctuated under the Preſſure of one's Fingers, as if they were filled with a viſcid glutinous Matter (which might probably ariſe from the Obſtruction of the lymphatic Veſſels,

ſels, and the Effuſion of ſizy Lymph into the cellular Membranes) no Symptoms of Suppuration having ever appeared. He had another Swelling on the Spine of the inferior Dorſal *Vertebræ*, as large as that on his Wriſt; but it was much harder, and the moſt painful, which prevented him from changing the Poſition he was laid in: This had produced an *Anchyloſis*, or an Immobility of Four or Five Joints of the *Vertebræ* of his Loins: The Pain in this Part was abated before he came to *Bath*, but his other Pains, and this in a very conſiderable Degree, and his Loſs of Appetite, his Cough, his Emaciating, and Loſs of Strength, ſtill continued. In this Condition he went on his own Accord, about the Middle of *May*, to *Lincomb Spaw*, being ſo weak, that he was Four Hours in going from *Bath* to the Spring. He drank about a Pint of the *Spaw Water* that time, and return'd with the like Difficulty. That Night the Pain in his Back increaſed, and was ſo violent, that he, and others in the Hoſpital, where he then was, thought he could not live till the Morning: About Three o'Clock that Morning he paſſed off a large Quantity of Gravel, mixed with a great deal of viſcid glutinous Matter, by Urine; upon which his Pains abated much, and he grew better, which induced him to go again the next Day but one, (not being able to go the next Day) after which he went to the *Spaw* every Day, and gradually increaſed his Doſe of the Waters to about Two Pints every Morning. His Pains wore off, his Appetite and Strength increaſed, his Swellings diminiſhed and waſted, his Cough abated, and his whole Habit was ſo recruited, that in about Four or Five Weeks time he could walk to the *Spaw* in leſs than half an Hour, which at firſt he could not do in leſs than Four. He continued to drink the *Spaw Waters* till the Firſt of *July*, in all about Seven Weeks, and then walked home to *Whitſtable*, near *Canterbury*.

HIST. II.

A Perſon aged about 82, who had naturally a fine, ſtrong, healthy Conſtitution, which his Temperance and regular Living had preſerved ſo, was at this Age affected with an *Incontinentia Urinæ*, accompanied with great Heat and Pain; a Diſorder which frequently baffles all Attempts to relieve it, and too often, at the beſt, admits but of a palliative Cure, at this Time of Life. Upon hearing his Complaints, I adviſed him to drink the *Lincomb Spaw Waters:* They purged him gently, Three or Four times a Day, at firſt; afterwards they paſs'd off by Urine, quickened his Appetite, raiſed his Spirits, took off the Heat and Pain in making Water intirely, and ſo ſtrengthened thoſe Parts in a few Days time; that he could retain his Urine, and make Water as freely and well as ever. About half a Year after, upon taking Cold, his Diſorder returned, and was again removed by the ſame Remedy in Two Days time, but I adviſed him to continue drinking them for ſome Weeks, which he did. He has in the Three Years ſince, upon taking Cold, had ſome ſlight Returns, which the Waters have always relieved.

HIST. III.

A Man about 54 Years of Age, who had been afflicted with nephritick Pains for ſeveral Years, with great Pain in the Neck of the Bladder, and a frequent Stopage in his Urine, ſo that he was obliged to have it drawn off by a Catheter, tho' he never paſs'd any Stones, was ſeized with an *Iſchuria*, or total Stoppage of Urine, with a great Weight and Pain in the Neck of the Bladder, which brought on the uſual nephritick Pains: Theſe continued for Two Weeks, during which time he could never paſs any Urine more than a few Drops at a time, and that with great Pain, ſo that he was obliged to have it drawn off with a Catheter every Day: In this Condition he was, after trying various Methods and Medicines, adviſed to try the *Lincomb Spaw Water*; he drank it the next Day, and it paſs'd freely without much Pain, and carried off a conſiderable Quantity of red Gravel with it, upon which his Pains left him, and he continued to drink the *Spaw Waters* for ſome time; but as it render'd him coſtive, he took a little *Lenitive Electuary* two or three times a Week, which kept his Body temperate, and the Waters paſs'd very freely, being pretty well recover'd and eaſy; but, either through Buſineſs or Indolence, he neglected drinking the Waters; and about half a Year after, upon uſing violent Exerciſe, his Diſorder and Stoppage of Urine returned; and an unskilful Hand, being imploy'd to introduce the Catheter, ſo hurt and bruiſed the Paſſage, that he diſcharged a conſiderable Quantity of Blood immediately, as well as at various times ſince, upon being overheated with too violent Exerciſe or Motion, and has render'd the Introduction of the Catheter impracticable, and probably has contributed to bring on thoſe Returns of his Diſorder, which he has had ſince; but he always finds, that upon drinking the Waters they paſs off freely by Urine, and without Pain, except a little at the firſt: They have always given him immediate Relief, and kept him well for a conſiderable time after uſing them.

HIST. IV.

A Girl of 13 had violent Pains in her Stomach, Belly, and Hips, accompanied with very frequent Purging, and almoſt total Loſs of Appetite, for near Two Years; ſhe ſometimes complained of a Pain in her Head, and Dizzineſs, but was never free from the Complaint of her Stomach and Belly, which were always increaſed after eating, and ſometimes were ſo violent as to force her to vomit, which for the preſent gave her Eaſe. The long Continuance of theſe Diſorders had reduced her to a very low Condition, tho' ſeveral Methods had been tried to relieve her, but without Succeſs: She was at length deſired by ſome of her Acquaintance to try the *Lincomb Water*, which ſhe readily agreed to: In a few Days her Pains abated, the Vomiting and Purging ſtopp'd, her Appetite return'd, and in about Six Weeks ſhe got quite well, without the Aſſiſtance of any other Medicine.

HIST. V.

A Gentleman in the Army, above 50, of a natural ſtrong Conſtitution, and a brisk active Diſpoſition, being reduced to a bad State of Health by an Indigeſtion, accompanied with great Anxiety and Pain at his Stomach, and violent Vomitings, came to *Bath* in the latter End of *Auguſt* 1738. The Pain was not continual, but return'd at uncertain Intervals with great Violence, he being at other times tolerably free from it for ſeveral Days together, tho' he was ſcarce ever free from flatulent Oppreſſion, great Anxiety, and a Dejection of Spirits; neither did the Pain at all times, when it returned, ſeize his Stomach, but ſometimes his Breaſt, and ſometimes the internal Region of his Loins, and the Seat of the Kidneys; yet without any Obſtruction in his Urine, which was generally at thoſe times high-coloured, and leſs in Quantity than uſual: The Pain ſometimes alſo ſeized his Bowels, but moſt frequently his Stomach, when it was always attended with violent Vomiting, which continued for One, Two, or Three, and ſometimes Four Hours, without any, or very little, Intermiſſion, and then left him with great Anxiety and Dejection of Spirits. He drank the *Bath Waters* regularly from *Auguſt* 1738. to the 9th of *March* following, and had ſeveral Vomits, Purges, Clyſters, and various other Medicines, both with and without the *Bath Waters*, was bled twice, and obſerved a regular low Diet all the time, but without any Advantage: I was called to him on the 9th of *March*, and found him vomiting violently, with great Anxiety and Pain at his Stomach and

Breaſt, accompanied with cold clammy Sweats, which ſtood in great Drops on his Face; which Symptoms he ſaid had then continued near Three Hours without Intermiſſion: He was drinking an Infuſion of Chamomile-flowers, as uſual, to encourage the Vomiting, which he ſaid was the only thing that gave him any Relief in thoſe Paroxyſms, which, he told me, then returned ſometimes once or twice a Day; at other times not oftener than once in Three or Four Days, when he always brought up a great Quantity of tough viſcid Phlegm, as I obſerved he had diſcharged at that time. Whether his Body was open or coſtive, it gave him no Relief; wherefore I directed ſome very warm *Saline Draughts* for that and the next Day, and gave him a *Bolus* of *Philon. Roman.* &c. each Night, and the next Morning following adviſed him to drink the *Lincomb Spaw Water*, and preſcribed him a warming Electuary to take with the firſt Glaſs every Night and Morning, with a more generous Diet than he had uſed with the *Bath Waters*, as I apprehended ſomething of the *Anomalous Gout* to be the Cauſe. He drank a Pint and half of the *Spaw Water* every Morning, at Three or Four times, with proper Intervals, and half a Pint at Nights, and in leſs than Two Weeks was able to ride to the *Spaw*. His Appetite, Digeſtion and Spirits increaſed, and he recovered Strength daily, and had no Return of his Pain in any conſiderable Degree, nor any Vomiting from the firſt Time I ſaw him till he had drank the Waters Five or Six Weeks, when he was ſeized with a Fit of Vomiting, tho' not ſo violent as uſual; upon which, after drinking Three or Four Pints of Chamomile Tea, and diſcharging his Stomach, I gave him a warming *Bolus*, with a ſaline Mixture, and bathed his Feet in warm *Bath Water*, at going to Bed, having ſome Suſpicion of a Fit of the Gout; the Vomiting ceaſed, and the next Morning his Foot was inflamed, red, painful and ſwelled, which continued for Three Days, and then went off: After this he drank the *Spaw Water* regularly as before, and uſed a more generous Diet and Exerciſe, and had no more Returns of his Pain or Vomiting. He continued this Courſe till the Beginning of *July*, and went away from *Bath* perfectly recovered: I ſaw him ſome Months after, when he was grown fat, jolly, and hearty as ever, and I hear continues ſo.

HIST. VI.

A Lady about 60 Years of Age came to *Bath*, with a Loſs of Appetite, Indigeſtion, and frequent Vomiting after Eating; She had drank *Tunbridge Waters*, and taken various Medicines, without Succeſs; ſhe took ſeveral Vomits, drank the *Bath Waters*, with Antiemetics and Stomachics, in different Forms, with and without the *Bath Waters*, for ſeveral Weeks, but not to much better Purpoſe; for tho' her Appetite was ſomething better, yet ſhe very ſeldom could retain what ſhe eat, but in Three or Four, and ſometimes Six or Eight Hours after Dinner, ſhe brought it up, with every thing elſe, which ſhe had took in that time; ſo that ſhe rarely went to Bed without clearing her Stomach of every thing. Having thus tried all the uſually ſucceſsful Methods, and the *Bath Waters*, a conſiderable time, but in vain, I adviſed her to drink the *Lincomb Spaw Water*; and as it was then in the middle of Winter, ſhe took a ſmall Doſe of *a bitter Stomach Electuary*, Night and Morning, with the firſt Glaſs of the Water, leſt it ſhould be too cold at that time of the Year; ſhe had the Water brought to her in Bottles; it ſat light on her Stomach, agreed well with her, ſtopp'd her Vomiting, increaſed her Appetite, ſtrengthened her Digeſtion; ſhe recover'd her Strength, and went away well the Spring following.

HIST. VII.

A Gentlewoman about 30 Years of Age, from Cold taken in Childbed, was ſeized with a Fever, which reduced her extremely,

and

and ended in an Hectick, with a Loſs of Appetite, a Reſtleſſneſs, Watching, and a Pain and Lameneſs in one Thigh. She came to *Bath* ſome time in *March* or *April*, took various Medicines, and (I think) drank the *Bath Waters*, without any Relief, but rather an Increaſe of her Diſorder. She then was told, that if taking Quickſilver would not cure her, nothing would; ſhe took it for ſeveral Weeks, without any Relief, and her Phyſician going out of the Town for ſome Weeks, ſhe ſent for me in *June*; I found her Hectick Fever ſo ſtrong, and her Thirſt and burning Heat ſo violent, that ſhe was frequently a little delirious, eſpecially in the Nights, with profuſe Sweat towards Morning, and ſometimes a few looſe Stools; ſhe had little or no Cough, nor any Symptom of her Lungs being inflamed; ſhe had a conſtant Thirſt, no Appetite, little Sleep, and that confuſed, and was ſo weak as to need Aſſiſtance to get from her Bed to her Chair. I gave her ſome cooling Draughts, with *Sal Abſinth. &c.* an *Emulſion* and *Diacodium* at Nights, for Two or Three Days, and then a *ſweetening cooling Decoction*, with ſome Drops of *Elix. Vitrioli Mynſ.* Three or Four times a Day, for Four or Five Days more. Her Hectick Fever being much abated, I deſired her to drink the *Lincomb Spaw Water*, which was brought to her Night and Morning: It agreed well with her, ſat light on her Stomach; her Thirſt, Hectick Heats, and Pain in her Head, which attended it, abated; her Appetite and Strength daily increaſed, and a Tumour aroſe in that Thigh, which the Pain and Lameneſs had ſeized, which being aſſiſted by Cataplaſms, *&c.* ſuppurated and diſcharged a conſiderable Quantity of Matter. She continued to drink the *Spaw Water* all the time, her Appetite and Digeſtion recruited, ſhe recover'd her Strength and Fleſh, the Ulcer healed, and ſhe went away well.

The CONCLUSION.

IT is well known, that cold Waters in general, but thoſe of the Chalybeat kind eſpecially, contract and corroborate the animal Solids; they increaſe hereby the *Momentum* of the Fluids, and promote their Attenuation, and are from theſe Effects uſeful in removing Obſtructions in the ſmaller Veſſels.

It is likewiſe well known, that all warm Waters relax; yet at the ſame time, from their Warmth, and the active Principles which many of them contain, they increaſe the Velocity of the Fluids; by which joint Actions of relaxing the Solids, and increaſing the Motion of the Fluids, they contribute very efficaciouſly to remove every Obſtacle in the Courſe of Circulation.

To recover a free Circulation in the ſmalleſt Veſſels, and reſtore the neceſſary Strength and Firmneſs of the Solids, being the principal Indications in the Cure of moſt chronical Diſeaſes; it ſeems a very natural Method to obtain theſe Effects, to recommend the Uſe of cold chalybeat Waters, after the warm ones have been ſufficiently uſed; which Method the *German* Phyſicians judiciouſly practiſe in adviſing their Patients to drink the *Geronſter Water* at *Spa*, after a competent Stay at *Aix la Chapelle*.

What Reſemblance there is betwixt the *Geronſter Water* and the *Lincomb*, has been impartially inquired into above. We ſhall therefore ſubmit it to the Conſideration of the Judicious, whether, after a proper Uſe of the warm Waters of *Bath*, this cold Chalybeat may not be of the like Advantage in many chronical Caſes.

APPENDIX.

I Obſerved p. 40. N°. 21. that I made thoſe Experiments upon Portions of *Water equally cold.* To ſhew the Neceſſity of attending to this Circumſtance, I ſhall relate a few Experiments, made indeed with a View to diſcover the Cauſes of the Variation of Weight obſervable in the *Lincomb Water:* But as they did not ſeem to prove any thing, ſo much as that very great Care is requiſite, in reſpect to Heat and Cold, in Hydroſtatical Experiments, I only gave them a Place here.

The Glaſs Cylinder (Fig. 3.) was filled with *Spaw Water*, freſh taken up at the Spring; and the Hydrometer, whoſe Bulk is equal to 13½ cubick Inches of Water, was immerged into it, without Delay. The Depth it ſunk to immediately, and the Degrees it afterwards ſubſided to, upon ſeveral Trials, are as follows: At the firſt Immerſion, on

June

		Inches.		Inches.
June 4.	It ſtood at	$2\frac{1}{10}$.	In 4 Hours it ſubſided to	$3\frac{2}{10}$.
24.	- - -	$2\frac{6}{10}$.	- - - - - - - -	5.
July 15.	- - -	2.	- - - - - - - -	$5\frac{8}{10}$.
Aug. 24.	- - -	$2\frac{7}{10}$.	- - - - - - - -	$4\frac{3}{10}$.

It appears from hence, that the ſpecific Gravity of the Water is different, at different times, as we obſerv'd before, tho' the Experiments are made when the Water is equally cold; but we find, that from ſome Cauſe or other, the Variation of its Gravity upon ſtanding appears much more conſiderable, which Cauſe is the different Degree of Heat and Cold, as is evident from the following Experiment:

Some very heavy cold Pump-water was put into a Glaſs Cylinder, and the Hydrometer immerged; *Fahrenheit's* mercurial Thermometer was at the ſame time ſuſpended in the Water. To this cold Water was added, at different times, ſo much warm Water as made what Alteration we pleaſed, raiſing the Mercury, and at the ſame time, by rendering the Water more light, ſinking the Hydrometer at Pleaſure. *N. B.* The warm Water made uſe of was out of the ſame Pump as the cold.

When the Mercury in the Thermometer ſtood

At 54 Degrees, the Hydrometer ſunk	1 Inch.
58	2
62	3
66	4
70	5
74	6
78	7
82	8

The Stem of the Hydrometer being no longer, I could not proceed with my Experiments any further. Theſe are ſufficient to ſhew, that a cloſe Attention to the Degrees of Heat in the Water, in which we try the ſpecific Gravity of Bodies, as well as of Water itſelf, is abſolutely neceſſary. It is to be wiſh'd, that we had ſome certain Rules of Proportion in this Caſe; but the Eſtabliſhment of theſe muſt be left to Time and Induſtry. However, it will be eaſy to remedy, in ſome Degree, the Inconvenience which theſe Experiments are liable to from the Alteration of Heat, by placing the Cylinder in a large Body of Water, the Alteration of which will be ſlow, and may be eaſily regulated, by adding cold Water, as we obſerve from the Thermometer, that it grows the leaſt warmer. And ſome ſuch Contrivance is neceſſary, if we would have the genuine Hiſtory of the ſpecific Gravity of Bodies.

Expli-

Explication of the FIGURES.

Fig. 1. The Hydroſtatical Glaſs deſcrib'd, p. 7. to the larger Neck of which is fixed, The braſs Hook, Fig. 2. *B.* by the Collar *C.* ſecured by a Screw. In the larger Neck of the Glaſs, Fig. 1. ſhould have been repreſented a ſmall glaſs Knob at the Mark $\frac{1}{2}$ which prevents the Collar from ſlipping up the Tube; and ſpoiling the Experiment. Fig. 3. is the glaſs Cylinder, and within it the graduated Hydrometer, as made by Dr. *Deſaguliers*.

FINIS.

ERRATA.

Pag. 2. Line 9. for *diſtant*, r. *diſtinct*. p. 3. l. 17. for *Years*, r. *Months*; ibid. l. 30. r. *red Powder, reſembling* Crocus Martis. p. 27. l. 15. r. *generates*. p. 34. l. 9. for *its*, r. *the*. p. 42. l. 8, 9. for *a larger Quantity*, r. *ſome Part*. p. 47. l. 5. for *dark-blue*, r. *faint-blue*. p. 48. l. 13. for *Violets*, r. *Syrup of Violets*. p. 52. l. 11. for *of the*, r. *to the*. p. 62. l. 7. r. *Oppreſſions*. p. 66. l. 16. r. *Sweats*.